

AMENDMENTS TO THE CLAIMS

1. (Currently amended) A sensor protein comprising a fusion protein which comprises a reporter protein which can generate a measurable signal selected from the group consisting of: Fluorescent Protein, alkaline phosphatase and kanamycin nucleotidyltransferase, or a fragment or mutant thereof, and

a binding protein which is 100 to 1000 amino acid residues in length, which specifically recognizes and binds a target substance, and which changes the structural stability of the fusion protein upon binding to the target substance, wherein the binding protein is inserted into the amino acid sequence of the reporter protein at an exposed site on the structural surface of the reporter protein, and wherein the insertion of the binding protein does not disrupt the ability of the reporter protein to generate the measurable signal.

2. (Canceled)

3. (Previously presented) The sensor protein according to Claim 1 wherein the binding protein is selected from the group consisting of metal ion-binding proteins, DNA-binding proteins, cAMP-dependent protein kinase, cGMP-dependent protein kinase, hydrolase, ATP-binding proteins, GTP-binding proteins, nitric monoxide synthase, glucose-binding proteins, maltose-binding proteins, hormone receptors, single chain antibodies and chaperons; or a fragment thereof which changes the structural stability of the fusion protein upon binding to the target substance.

4-5. (Canceled)

6. (Currently amended) The sensor protein according to Claim 4 1, wherein the fluorescent protein is Green Fluorescent Protein, Red Fluorescent Protein or a mutant thereof.

7. (Currently amended) The sensor protein according to Claim 6 1, wherein the reporter protein is the Green Fluorescent Protein and the binding protein is inserted between the amino acid residues of 128 Ile to 205 Ser of the Green Fluorescent Protein.

8. (Canceled)

9. (Previously presented) The sensor protein according to Claim 1, which is comprised of a fusion protein, wherein the binding protein is an aryl hydrocarbon receptor and the reporter protein is alkaline phosphatase.

10. (Withdrawn) A nucleic acid encoding the protein according to any one of claims 1 to 9.

11. (Currently amended) A method of preparing a sensor protein according to claim 1, comprising the steps of:

(a) inserting a DNA encoding ~~the~~ a binding protein into a DNA sequence encoding the a reporter protein which can generate a measurable signal,

wherein the binding protein is 100 to 1000 amino acid residues in length, and specifically recognizes and binds a target substance, and which changes the structural stability of the fusion protein upon binding to the target substance, wherein the binding protein is inserted into the amino acid sequence of the reporter protein at an exposed site on the structural surface of the reporter protein, and wherein the insertion of the binding protein does not disrupt the ability of the reporter protein to generate the measurable signal, and

wherein the reporter protein is selected from the group consisting of: Fluorescent Protein, alkaline phosphatase and kanamycin nucleotidyltransferase, or a fragment or mutant thereof; and

(b) expressing the resultant DNA encoding the fusion protein.

12. (Currently amended) A method of preparing a sensor protein according to claim 1, comprising the steps of:

(a) inserting a DNA encoding ~~the~~ a binding protein into a DNA sequence encoding ~~the~~ a reporter protein which can generate a measurable signal,

wherein the binding protein is 100 to 1000 amino acid residues in length, and specifically recognizes and binds a target substance, and which changes the structural stability of the fusion protein upon binding to the target substance, wherein the binding protein is inserted into the amino acid sequence of the reporter protein at an exposed site on the structural surface of the reporter protein, and wherein the insertion of the binding protein does not disrupt the ability of the reporter protein to generate the measurable signal, and

wherein the reporter protein is selected from the group consisting of: Fluorescent Protein, alkaline phosphatase and kanamycin nucleotidyltransferase, or a fragment or mutant thereof; and

(b) introducing a mutation into the resultant DNA sequence encoding the fusion protein to obtain a population of mutants of the DNA sequence encoding the fusion protein;

(c) expressing the population of mutants of the DNA sequence encoding the fusion protein to obtain a population of mutants of the fusion protein; and

(d) selecting the fusion protein having the desired function from the population of mutants of the fusion protein by detecting a change in the detection signal generated from the reporter protein by the action of a target substance to the binding protein.

13. (Withdrawn) The method according to Claim 12, wherein the steps (b), (c) and (d) are repeatedly carried out.

14. (Previously presented) A sensor protein according to claim 1 prepared by the method according to any one of Claims 11 to 13.

15. (Withdrawn) A nucleic acid encoding the protein according to Claim 14.

16. (Withdrawn) An expression vector containing the nucleic acid according to Claim 10 or 15.

17. (Withdrawn) A transformed cell having the expression vector according to Claim 16.

18. (Withdrawn) A method of preparing a sensor protein, comprising the steps of culturing the transformed cell according to Claim 17; and harvesting said sensor protein from the culture.

19. (Withdrawn) A method of detecting or determining a target substance, comprising the steps of:

reacting the sensor protein according to any one of claims 1 to 9 and 14 with said target substance; and

measuring a change in the detection signal generated from the reporter protein that constitutes the sensor protein.

20. (Withdrawn) A method of detecting or determining a target substance, comprising the steps of:

reacting the sensor protein according to any one of claims 1 to 9 and 14 with said target substance; and

measuring a change in the detection signal generated from the reporter protein that constitutes the sensor protein.

21. (Withdrawn) The method according to Claim 19, wherein the reporter protein is a fluorescent protein.

22. (Withdrawn) The method according to any one of Claims 19 to 21, wherein detection or determination of the target substance is carried out in a living cell, tissue or individual.

23. (Withdrawn) The method according to Claim 19, wherein the sensor protein is an insert-type fusion protein formed by inserting the amino acid sequence of Ah receptor into the amino acid sequence of alkaline phosphatase, and the target substance is dioxins or polychlorinated biphenyl.

24. (Withdrawn) The method according to Claim 19, wherein the sensor protein is an insert-type fusion protein formed by inserting the amino acid sequence of calmodulin into the amino acid sequence of a fluorescent protein, and the target substance is a calcium ion.

25. (Withdrawn) The method according to Claim 19 wherein the sensor protein is an insert-type fusion protein formed by inserting the amino acid sequence of a single chain antibody into the amino acid sequence of alkaline phosphatase, and the target substance is an antigen.

26. (Withdrawn) A reagent kit for performing the method according to any one of Claims 19 to 24, which comprises the sensor protein according to any one of Claims 1 to 9 and 14 or the nucleic acid according to Claim 10 or 15.

27. (Currently amended) The sensor protein according to Claim 1, wherein the reporter protein is a the Green Fluorescent Protein and the binding protein is a hormone receptor.

28. (Previously presented) The sensor protein according to Claim 27, wherein the hormone receptor is an aryl hydrocarbon receptor.